

Application No. 10/731,351
Amdt. Dated Aug. 10, 2004
Response to Office Action of May 11, 2004

REMARKS

Applicants had submitted a Preliminary Amendment on May 12, 2004, which amendment was not entered or considered in the Office Action, dated May 11, 2004, as the preliminary amendment was submitted after the mailing date of the Office Action. Applicants have incorporated the contents of the non-entered preliminary amendment into this response. The proposed amendments to the specification and to the claims are intended to place the present application in a form acceptable to the United States Patent and Trademark Office, and to eliminate any indefiniteness that may exist in the aforesaid translated version.

In the Office Action, the Examiner rejected claims 1 and 2 under 35 USC § 102(b) as being anticipated by U.S. Patent No. 5,927,322 to Rosenau. The Examiner also rejected claims 1-10 under 35 USC § 102(b) as being anticipated by U.S. Patent No. 6,311,674 to Igashira. Claims 1-10 are pending. Applicants have amended claims 1-6 and 8.

As amended, claim 1 is directed to a common rail fuel injection control device including, among other things, a metering valve controlled to an opening degree by a duty drive signal, means for determining a value of a base duty according to an engine operation state, means for determining a value of a final duty, and means for supplying the duty drive signal with the value of the final duty to the metering valve. The base duty is associated with a base target opening degree of the metering valve. The value of the final duty oscillates periodically around the value of the base duty.

Independent claim 3 is directed to a common rail fuel injection control device including, among other things, means for controlling an opening degree of the metering valve by a duty drive signal so that a pressure difference between a target common rail pressure and an actual common rail pressure becomes zero, means for determining a value of a base duty equivalent to a base target opening degree of the metering valve based on the pressure difference, means for generating a value of an oscillation duty which oscillates with a constant period

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and a constant amplitude; and means for determining a value of a final duty which has to be applied to the metering valve by adding the value of the oscillation duty to the value of the base duty.

Rosenau:

The Examiner rejected claims 1 and 2 under 35 USC § 102(b) as being anticipated by Rosenau. Applicants respectfully disagree and traverse this rejection below.

Rosenau fails to disclose supplying a duty drive signal, having the value of a final duty, to the metering valve, wherein the value of the final duty oscillates periodically around the value of a base duty, which is associated with a base target opening of the metering valve, as recited in amended claim 1. Rosenau merely discloses that the position of a valve member 16 changes in accordance with the movement of an electromagnet armature 3, "wherein the armature is displaced more or less depending on the degree of excitation. This can take place in a known manner with a variable analogue voltage or with a synchronous triggering of the electromagnet." [col. 2, line 62 – col. 3, line 1]. Rosenau discloses that the movement of the armature, and hence, the opening and closing of the valve member, depends on the degree of excitation of the electromagnet. Rosenau fails to disclose that the degree of excitation of the electromagnet oscillates periodically, much less that the degree of excitation of the electromagnet oscillates periodically around a base value of excitation. Thus, although Rosenau discloses controlling the opening degree of a valve member, Rosenau fails to disclose supplying a duty drive signal, which periodically oscillates around a base duty value, to the metering valve.

Therefore, Rosenau does not disclose a metering valve controlled to an opening degree by a duty drive signal, wherein the value of the final duty oscillates periodically around the value of a base duty, as recited in claim 1. Accordingly, claim 1 is not anticipated by Rosenau, because Rosenau does not disclose each and every element of claim 1. Claim 2 depends from claim 1 and

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contains additional recitations thereto. Therefore, for at least the reasons discussed above, claim 2 is also not anticipated by Rosenau.

Igashira:

The Examiner rejected claims 1-10 under 35 USC § 102(b) as being anticipated by Igashira. Applicants respectfully disagree and traverse this rejection below. Claims 1 and 3 are independent claims.

With respect to amended claim 1, Igashira fails to disclose supplying a duty drive signal, having the value of a final duty, to the metering valve, wherein the value of the final duty oscillates periodically around the value of a base duty, which base duty is associated with a base target opening of the metering valve, as recited in claim 1. Igashira discloses a metering valve 40 receiving an input drive current pulse having a base value, or target duty, and a pulse duration (see, for example, Fig. 5(a)). The target duty of Igashira (I_{DUTYr}) is determined based on the engine operation state. This target duty value, which controls the opening degree of the valve, is a constant. The value of the final duty drive signal sent to the metering valve of Igashira does not oscillate around a target duty, but rather remains constant and equal to the target duty. [Col. 11, line 48 – col. 12, line 36.] What oscillates in the system disclosed by Igashira is the *duration* of the duty drive signal, not the *value* of the duty drive signal. As shown in Figs. 5(a) and 5(c) of Igashira, the value of the final duty signal is constant, but the valve on-off duration control oscillates between a closed and an open position. In Fig. 5(c), the value of the final duty signal is constant, while the ratio of on-off duration varies. Thus, at most Igashira teaches a duty signal oscillating between a constant final duty signal value and a zero duty value. Igashira fails to disclose a final duty value oscillating periodically around the value of the base duty.

Therefore, Igashira does not disclose a metering valve controlled to an opening degree by a duty drive signal, wherein the value of the final duty oscillates periodically around the value of a base duty, as recited in claim 1. Accordingly, claim 1 and its dependent claim, claim 2, are not anticipated by

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Igashira, because Igashira does not disclose each and every element of these claims.

With respect to independent claim 3, Igashira fails to disclose (1) means for generating a value of an oscillation duty which oscillates with a constant period and a constant amplitude and (2) means for determining a value of a final duty which has to be applied to the metering valve by adding the value of the oscillation duty to the value of a base duty, which is equivalent to a base target opening degree of the metering valve based on a pressure difference. As discussed above, Igashira discloses that the value of the final duty drive signal, which controls the opening degree of the metering valve, does not oscillate around a target duty, but rather remains constant and equal to the target duty. Igashira fails to determine the value of a final duty by generating a value of an oscillation duty, which oscillates with a constant period and a constant amplitude, and adding this oscillation duty to the value of a base duty.

Therefore, Igashira does not disclose each and every element of claim 3. Claims 4-10 depend from claim 3, directly or indirectly, and contain additional recitations thereto. Therefore, for at least the reasons discussed above, claims 3-10 are not anticipated by Igashira.

Applicants respectfully submit that claims 1-10 are not anticipated by either Rosenau or Igashira, and that all pending claims are allowable. Favorable reconsideration of these claims is requested.

Although Applicants do not believe a fee is due with the submission of

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this Amendment, if it is deemed that a fee is required, please charge to Deposit
Account 13-0235.

Respectfully submitted,

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